

Jared F. Miller

CONVEX OPTIMIZATION · NONLINEAR SYSTEMS · CONTROL

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Education

Northeastern University

Boston, MA, USA

PH.D. IN ELECTRICAL AND COMPUTER ENGINEERING

Sept. 2018 - May 2023

- Communications, Control, and Signal Processing (CCSP)
- Advised by Prof. Mario Sznaiier
- Thesis Title: “Safety Quantification for Nonlinear and Time-Delay Systems using Occupation Measures” [link]
- Thesis Committee: Octavia Camps, Didier Henrion (LAAS-CNRS), Bahram Shafai, Eduardo Sontag, Mario Sznaiier
- GPA: 4.0 (4.0 Scale)

M.S. IN ELECTRICAL AND COMPUTER ENGINEERING

Sept. 2015 - May 2018

- Communications, Control, and Signal Processing (CCSP)
- GPA: 3.852 (4.0 Scale)

B.S. IN ELECTRICAL ENGINEERING

Sept. 2013 - May 2018

- Minor in Mathematics
- GPA: 3.865 (4.0 Scale), Summa cum Laude

Research Publications

Journal Papers (published)

1. Jared Miller and Mario Sznaiier. Data-Driven Gain Scheduling Control of Linear Parameter-Varying Systems using Quadratic Matrix Inequalities. *IEEE Control Systems Letters*, 2022. [link] (LCSS-ACC)
2. Jared Miller, Yang Zheng, Mario Sznaiier, and Antonis Papachristodoulou. Decomposed structured subsets for semidefinite and sum-of-squares optimization. *Automatica*, 137:110–125, 2022. [link]
3. J. Miller, D. Henrion, and M. Sznaiier. Peak Estimation Recovery and Safety Analysis. *IEEE Control Systems Letters*, 5(6):1982–1987, 2021. [link] (LCSS-ACC)
4. Jared Miller, Muhammad Ali Al-Radhawi, and Eduardo Daniel Sontag. Mediating Ribosomal Competition by Splitting Pools. *IEEE Control Systems Letters*, 5(5):1555–1560, 2021. [link] (LCSS-ACC)

Journal Papers (accepted)

1. Jian Zheng, Tianyu Dai, Jared Miller, and Mario Sznaiier. Robust Data-Driven Safe Control using Density Functions, 2023. [link] (Accepted by IEEE Control Systems Letters in 2023)
2. Jared Miller and Mario Sznaiier. Bounding the Distance to Unsafe Sets with Convex Optimization, 2021. [link] (Accepted by IEEE Transactions on Automatic Control in 2023)

Conference Proceedings (published)

1. Jared Miller and Mario Sznaiier. Bounding the Distance of Closest Approach to Unsafe Sets with Occupation Measures. In *2022 61st IEEE Conference on Decision and Control (CDC)*, pages 5008–5013, 2022. [link]
2. Jared Miller, Tianyu Dai, and Mario Sznaiier. Data-Driven Superstabilizing Control of Error-in-Variables Discrete-Time Linear Systems. In *2022 61st IEEE Conference on Decision and Control (CDC)*, pages 4924–4929, 2022. [link] (Outstanding Student Paper Award)
3. Filip Bečanović, Jared Miller, Vincent Bonnet, Kosta Jovanović, and Samer Mohammed. Assessing the Quality of a Set of Basis Functions for Inverse Optimal Control via Projection onto Global Minimizers. In *2022 IEEE 61st Conference on Decision and Control (CDC)*, pages 7598–7605, 2022. [link]
4. Jared Miller and Mario Sznaiier. Facial Input Decompositions for Robust Peak Estimation under Polyhedral Uncertainty. *IFAC-PapersOnLine*, 55(25):55–60, 2022. [link] (IFAC Young Author Award)
5. Jared Miller, Didier Henrion, Mario Sznaiier, and Milan Korda. Peak Estimation for Uncertain and Switched Systems. In *2021 60th IEEE Conference on Decision and Control (CDC)*, pages 3222–3228, 2021. [link] (Outstanding Student Paper Award)
6. J. Miller, R. Singh, and M. Sznaiier. MIMO System Identification by Randomized Active-Set Methods. In *2020 59th IEEE Conference on Decision and Control (CDC)*, pages 2246–2251, 2020. [link]
7. Jared Miller, Yang Zheng, Mario Sznaiier, and Antonis Papachristodoulou. Decomposed Structured Subsets for Semidefinite Optimization. In *2020 21st IFAC World Congress*, 2020. [link]
8. Chieh Wu, Jared Miller, Yale Chang, Mario Sznaiier, and Jennifer Dy. Solving Interpretable Kernel Dimensionality Reduction. In H. Wallach, H. Larochelle, A. Beygelzimer, F. d'Alché-Buc, E. Fox, and R. Garnett, editors, *Advances in Neural Information Processing Systems*, volume 32, pages 7915–7925. Curran Associates, Inc., 2019. [link] (acceptance rate 21.9%)
9. J. Miller, Y. Zheng, B. Roig-Solvas, M. Sznaiier, and A. Papachristodoulou. Chordal Decomposition in Rank Minimized Semidefinite Programs with Applications to Subspace Clustering. In *2019 IEEE 58th Conference on Decision and Control (CDC)*, pages 4916–4921, 2019. [link]

Conference Proceedings (published)

10. J. Miller and B. Shafai. A Model of Heave Dynamics for Bagged Air Cushioned Vehicles. In *2019 IEEE Conference on Control Technology and Applications (CCTA)*, pages 976–981, 2019. [link]
11. B. Taskazan, J. Miller, U. Inyang-Udoh, O. Camps, and M. Sznaier. Domain Adaptation Based Fault Detection in Label Imbalanced Cyberphysical Systems. In *2019 IEEE Conference on Control Technology and Applications (CCTA)*, pages 142–147, 2019. [link]

Conference Proceedings (accepted but not yet published)

1. Jared Miller, Tianyu Dai, and Mario Sznaier. Superstabilizing Control of Discrete-Time ARX Models under Error in Variables. In *2023 22nd IFAC World Congress*, 2023. [link]

Conference Proceedings (submitted)

1. Jared Miller, Matteo Tacchi, Mario Sznaier, and Ashkan Jasour. Peak Value-at-Risk Estimation for Stochastic Differential Equations using Occupation Measures, 2023. [link]
2. Jared Miller, Tianyu Dai, Mario Sznaier, and Bahram Shafai. Data-Driven Control of Positive Linear Systems using Linear Programming, 2023. [link]
3. Jared Miller, Milan Korda, Victor Magron, and Mario Sznaier. Peak Estimation of Time Delay Systems using Occupation Measures, 2023. [link]
4. Tooba Imtiaz, Morgan Kohler, Jared Miller, Zifeng Wang, Mario Sznaier, Octavia Camps, and Jennifer Dy. SAIF: Sparse Adversarial and Interpretable Attack Framework, 2022. [link]

Preprints

1. Jared Miller and Mario Sznaier. Quantifying the Safety of Trajectories using Peak-Minimizing Control, 2023. [link]
2. Jared Miller and Mario Sznaier. Analysis and Control of Input-Affine Dynamical Systems using Infinite-Dimensional Robust Counterparts, 2023. [link]
3. Jared Miller and Mario Sznaier. Peak Estimation of Hybrid Systems with Convex Optimization, 2023. [link]
4. Jared Miller, Tianyu Dai, and Mario Sznaier. Data-Driven Stabilizing and Robust Control of Discrete-Time Linear Systems with Error in Variables, 2022. [link]

Seminars

1. “Data-Driven Safety Quantification using Infinite-Dimensional Robust Convex Optimization,” May 29, 2023, Student Seminar Series on Optimization, Control & Learning, UC San Diego. [link]
2. “Quantifying Safety under Uncertainty using Occupation Measures,” May 26, 2023, Control Seminars @ UCI, UC Irvine
3. “Data-Driven Safety Quantification using Infinite-Dimensional Robust Convex Optimization,” May 19, 2023, Multi-Robot Systems Lab Meeting, Stanford University. [link]
4. “Analysis and Control of Time-Delay Systems Using Polynomial Optimization,” May 14, 2023, MS14 Studying Dynamics using Polynomial Optimization Tools, SIAM Conference on Dynamical Systems. [link]
5. “Data-Driven Control under Input and Measurement Noise,” April 9, 2023, Oden Institute Seminar, UT Austin. [link]
6. “Safety Analysis for Nonlinear and Time-Delay Systems using Occupation Measures,” April 3, 2023, PhD Thesis Defense, Northeastern University. [link].
7. “Data-Driven Control under Input and Measurement Noise,” NYU MERIT Lab Seminar Series, New York City, Feb 21, 2023. [link]
8. “Bounding the Distance to Unsafe Sets with Convex Optimization,” DCSD Rising Stars, 2nd Modeling, Estimation and Control Conference, Jersey City, October 2-5 2022. [link]
9. Tutorials about Convexity, Interior Point Methods, Frank-Wolfe algorithms (with applications to system identification), and Polynomial Optimization, June 27, 2022, From Data to Control, Israeli Association of Automatic Control (with M. Sznaier). [link]
10. “Bounding distances to unsafe sets”, June 16, 2022, IfA Coffee Talks, ETH Zurich. [link]
11. “Bounding distances to unsafe sets”, June 14, 2022, LA3 Meeting, EPFL Lausanne. [link]
12. “Bounding distances to unsafe sets”, June 3, 2022, Journées SMAI MODE, University of Limoges (XLIM). [link]
13. Tutorials about Interior Point Methods, Polynomial Optimization, Frank-Wolfe algorithms and variations, and SDP approximations, May 16-20, Sparsity and Big Data in Control, Systems Identification, and Machine Learning, European Embedded Control Institute.
14. “Bounding distances to unsafe sets”, April 14, 2022, Conic Linear Optimization for Computer-Assisted Proofs, Mathematisches Forschungsinstitut Oberwolfach (MFO). [link]
15. “Bounding distances to unsafe sets”, June 28, 2021, Brainstorming days on measure and polynomial optimization (BrainPOP), LAAS-CNRS. [link]
16. “Data-Driven Peak and Reachability Set Estimation”, May 25, 2021, MS112 Methods of Learning Dynamical Systems for Control, SIAM Conference on Dynamical Systems. [link]
17. “Analysis and Control of Time-Delay Systems with Occupation Measures”, May 3, 2021, BrainPOP, LAAS-CNRS. Work not yet published, in preparation. [link]
18. “Exploiting Structure in Rank-Constrained and Approximated Semidefinite Programs”, December 19, 2019, TISEM Operations Research Seminar, Tilburg University. [link]

Seminars (upcoming)

1. “Risk analysis for stochastic processes using polynomial optimization,” October 15-18, 2023, Convex Relaxations for Polynomial Optimization, INFORMS Annual Meeting, Phoenix, AZ.

Poster Sessions (without Conference Proceedings)

1. "Safety Analysis and Control using Measures." April 13, 2023, RISE 2023, Northeastern University. [link]
2. "Safety Analysis and Control using Measures." February 27, 2023, PhD Research Expo, Northeastern University. [link]
3. "Diameter Constrained Minimum Spanning Graphs." January 31, 2023, Current Themes of Discrete Optimization: Boot-camp for early-career researchers, ICERM. [link]
4. "Safety Analysis using Distance Estimation and Measures." August 24, 2022. CLEVR-AI MURI Yearly Review Meeting, Northeastern University. [link]
5. "Exploiting SDP Structure Yields Tighter Approximations." April 9, 2020. RISE, Northeastern University (remote). [link]
6. "Exploiting SDP Structure Yields Tighter Approximations." February 24, 2020. IPAM Control, Learning and Optimization workshop, University of California, Los Angeles. [link]
7. "Chordal Decompositions in Rank Minimized SDPs." May 30-31, 2019. Learning for Decision and Control (L4DC), Massachusetts Institute of Technology. [link]
8. "Chordal Decompositions in Rank Minimized SDPs." May 10, 2019. New England Machine Learning Day, Northeastern University. [link]
9. "Scattered data interpolation through B-spline wavelets and the Elastic Net." April 14, 2017. RISE, Northeastern University. [link]
10. "A parallelized Python-based Multi-Point Thomson Scattering analysis in NSTX-U." October 29, 2014. 56th Annual APS Plasma Physics Conference, New Orleans. [link]

Experience

Northeastern University

POSTDOCTORAL RESEARCHER, ROBUST SYSTEMS LAB, CONTROLS GROUP

Boston, MA, USA

May 2023 - Present

Northeastern University

RESEARCH ASSISTANT, ROBUST SYSTEMS LAB, CONTROLS GROUP

Boston, MA, USA

Jul. 2017 - April 2023

Laboratory for Analysis and Architecture of Systems (LAAS-CNRS)

CHATEAUBRIAND FELLOW, DECISION AND OPTIMIZATION, METHODS AND ALGORITHMS IN CONTROL (MAC) TEAM

Toulouse, FR

Jan. 2022 - Jul. 2022

Paradigm Hyperloop

CONTROL THEORIST, LEVITATION GROUP

Boston, MA, USA

Jul. 2017 - Dec. 2017

ASML Holding

CO-OP, METROLOGY GROUP

Veldhoven, NL

Mar. 2016 - Aug. 2016

Advanced Micro Devices (AMD)

CO-OP, SHADER COMPILER GROUP

Boxborough, MA, USA

Jan. 2015 - Jun. 2015

Princeton Plasma Physics Laboratory (PPPL)

INTERN/PART-TIME CONTRACTOR, DATA VISUALIZATION GROUP

Plainsboro Township, NJ, USA

Sep. 2012 - Feb. 2016

Cornell High Energy Synchrotron Source (CHESS)

SUMMER INTERN/RESEARCH ASSISTANT

Ithaca, NY, USA

Jul. 2012 - Aug. 2012

Teaching

Northeastern University

TEACHING ASSISTANT

- EECE 5644: Machine Learning and Pattern Recognition

Boston, MA, USA

Fall 2022

TEACHING ASSISTANT

- EECE 7345: Big Data, Sparsity, and Control

Fall 2021

European Embedded Control Institute

TEACHING ASSISTANT

- Sparsity and Big Data in Control, Systems Identification and Machine Learning

Toulouse, FR

May 16-20, 2022

Honors & Awards

Jun. 2023 Travel Award , 2023 American Control Conference (ACC)	<i>San Diego, CA</i>
Apr. 2023 ECE Excellence in Research Award , Northeastern University College of Engineering	<i>Boston, MA</i>
Jan. 2023 Travel Award , ICERM workshop: Current Themes of Discrete Optimization	<i>Providence, RI</i>
Dec. 2022 Outstanding Student Paper Award , 2022 61st IEEE Conference on Decision and Control	<i>Cancún, MX</i>
Dec. 2022 Travel Award , 2022 61st IEEE Conference on Decision and Control	<i>Cancún, MX</i>
Oct. 2022 ASME DSCD Rising Star Award , MECC 2022 (IFAC)	<i>Jersey City, NJ, USA</i>
Sep. 2022 IFAC Young Author Award , ROCOND 2022 (IFAC)	<i>Kyoto, JP (remote)</i>
Apr. 2022 Travel Award , MFO: Conic Linear Optimization for Computer-Assisted Proofs	<i>Oberwolfach, DE</i>
Jan. 2022 Travel Award (for Toulouse) , AFOSR FY22 International Student Exchange Program (ISEP)	<i>Arvada, CO, USA</i>
Dec. 2021 Outstanding Student Paper Award , 2021 60th Conference on Decision and Control	<i>Austin, TX, USA</i>
Apr. 2020 Chateaubriand Fellowship , Office of Science and Technology, Embassy of France in the USA	<i>Toulouse, FR</i>
Feb. 2020 Hosting , IPAM: Intersections between Control, Learning and Optimization (UCLA Workshop)	<i>LA, CA, USA</i>
Dec. 2019 Travel Award for Seminar , TISEM Seminar at Tilburg University	<i>Tilburg, NL</i>
Aug. 2019 Travel Award , 2019 IEEE Conference on Control Technology and Applications (CCTA)	<i>Hong Kong</i>
2013-2018 Honors Program , Northeastern University	<i>Boston, MA, USA</i>
2015-2018 Dean's List , Northeastern University	<i>Boston, MA, USA</i>

Skills

Programming	Matlab (incl. Simulink), Python, Mathematica, LaTeX, Julia, C/C++
MS Office	Word, Excel, PowerPoint, Publisher

Professional Organizations

Institute of Electrical and Electronics Engineers (IEEE)

(GRADUATE) STUDENT MEMBER

Sept. 2013 - Present

IEEE Eta Kappa Nu (HKN)

MEMBER, TUTOR

Sept. 2014 - Present

Society for Industrial and Applied Mathematics

MEMBER

Oct. 2019 - Present

IEEE CSS Technical Committee on Robust and Complex Systems (TC-RoCS)

MEMBER

Sept. 2022 - Present

IFAC Technical Committee 2.5 Robust Control

MEMBER

Sept. 2022 - Present

Professional Service

Reviewer

Automatica, IEEE Transactions on Automatic Control (TAC), IEEE Control Systems Letters (L-CSS), Learning for Dynamics & Control Conference (L4DC), IFAC Symposium on Robust Control Design (ROCOND), IEEE Conference on Decision and Control (CDC), European Control Conference (ECC), Nonlinear Analysis: Hybrid Systems, Kybernetika